Correlation Radiometer ASIC, Phase I

Completed Technology Project (2017 - 2017)

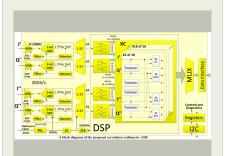


Project Introduction

The proposed project aims to develop an application specific integrated circuit (ASIC) for the NASA's microwave correlation radiometers required for space and airborne Earth sensing applications. The radiometer instrumentation installed on CubeSats and SmallSats is required to have small volume, low weight and consume low power. Currently used correlating radiometers rely on analog signal processing, thus are bulky, power hungry and cannot be reprogrammed. Analog filter parameters tend to be unstable over temperature, power supply voltage, may degrade over time and need tuning. The proposed low-power, rad-hard ASIC will operate with microwave correlation radiometer front ends down-converting the RF to up to 10GHz IF quadrature signals. The ASIC will include digitizers, bandpass filters, crosscorrelators, totalizers, serializers, an output data interface and an I2C interface for the ASIC's programming. Bandpass filters will split up the digitized quadrature IF input signals into bands (up to 16), will cross-correlate the signals within each band and will ship out the resultant data in a convenient format. Instead of analog signal processing performing a strictly defined function, the ASIC will employ a digital signal processing which can be reprogrammed to adopt specific parameters of the filter block such as the number of bands, each filter's corner frequency, bandwidth and filter's order. A number of innovations will be introduced to the ASIC in order to combine programmability, low power consumption and radiation tolerance. The project's Phase I will provide the proof of feasibility of implementing the proposed ASIC. Phase II will include finishing the design, chip fabrication, testing and delivering the ADC prototypes which will be ready for commercialization in Phase III.

Primary U.S. Work Locations and Key Partners





Correlation Radiometer ASIC, Phase I Briefing Chart Image

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Pacific Microchip Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer



Small Business Innovation Research/Small Business Tech Transfer

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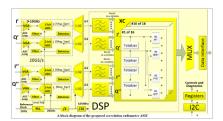
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Organizations Performing Work	Role	Туре	Location
Pacific Microchip	Lead	Industry	Culver City,
Corporation	Organization		California
Jet Propulsion Laboratory(JPL)	Supporting	NASA	Pasadena,
	Organization	Center	California

Primary U.S. Work Locations

California

Images



Briefing Chart Image

Correlation Radiometer ASIC, Phase I Briefing Chart Image (https://techport.nasa.gov/imag e/137114)

Project Management

Program Director:

Jason L Kessler

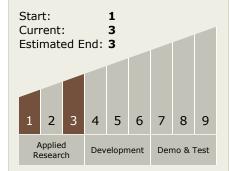
Program Manager:

Carlos Torrez

Principal Investigator:

Anton Karnitski

Technology Maturity (TRL)



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - ☐ TX08.1 Remote Sensing Instruments/Sensors
 - ☐ TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves

